Anthrax

REPORT IMMEDIATELY

(Also known as Woolsorters' disease, malignant pustule)

Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

Anthrax is a disease of mammals—including humans—caused by the spore-forming bacterium *Bacillus anthracis*. The bacterium is found in a reproductive (vegetative) state in human and animal tissue. When exposed to the environment, the vegetative organisms produce spores. Anthrax spores can survive in the environment for many years and are resistant to heat, cold, chemical disinfectants, and long, dry periods.

B. Clinical Description

Anthrax is an acute, febrile bacterial disease that most often involves the skin and lymph nodes, but depending on the route of exposure, it may also involve the throat, chest, or intestinal tract. The organism's virulence is mediated by its capsule and by the production of exotoxins. The toxins cause the tissue and organ damage associated with anthrax. Cutaneous anthrax, inhalational anthrax, and gastrointestinal anthrax are the clinical syndromes most often associated with infection with this organism.

Cutaneous Anthrax	In anthrax affecting the skin, itching of the affected skin occurs first. The itching is followed by development of a small red lesion that progresses to a blister, and ultimately (in 2–6 days), develops into a painless, scabbed ulcer with a central, black eschar and significant surrounding edema and redness. Accompanying fever and lymphadenopathy (swollen lymph nodes) are common, and the lesion can be misdiagnosed as an infected spider bite. Approximately 5–20% of people with untreated cutaneous anthrax die, although prompt treatment with effective antibiotics can significantly improve the clinical outcome.
Inhalational Anthrax	Initial symptoms of inhalational anthrax are generally mild and nonspecific, with fever, malaise, dry cough, and/or chest pain. Severe symptoms follow within 3–5 days; these include progressively worsening respiratory distress, fever, and shock, with death often following shortly thereafter. X-ray findings typically show a widened mediastinum. Hemorrhagic mediastinitis and/or meningitis are frequent severe complications. Treatment rarely prevents death once severe respiratory symptoms begin. The case-fatality rate for inhalational anthrax was reported as 85–100% in an outbreak in Sverdlovsk, USSR in 1979; more recently, among the cases reported in the U.S. in late 2001, there were 5 fatalities among 11 cases (45%).

Gastrointestinal Anthrax	Gastrointestinal anthrax is rare; it has been reported to occur following ingestion of undercooked meat from animals infected with anthrax. Symptoms of gastrointestinal anthrax may be difficult to recognize, and the diagnosis is often made late. Initial abdominal pain and distress are typically followed by fever, bloody diarrhea, symptoms of a blood infection (septicemia), and death. Even with treatment, the case-fatality rate for intestinal anthrax can approach 100%.
Oropharyngeal Anthrax	Oropharyngeal anthrax is a rare form of anthrax affecting the upper throat; it may include posterior oropharyngeal ulcers, which are typically unilateral and are associated with neck swelling, regional lymphadenopathy (swollen lymph nodes), and sepsis. Studies of prior outbreaks have suggested a case-fatality rate for oropharyngeal anthrax of 12–50%.

C. Vectors and Reservoirs

When exposed to the environment, the anthrax bacterium produces spores that are capable of surviving in soil for decades. The prolonged survival of spores in soil as well as intermittent infection of wild and domestic hoofed herbivores (plant-eating animals), including livestock, act as the reservoirs for anthrax. Anthrax spores are found in soils throughout the world. Skins and hides of infected animals may also harbor the spores for years, and occupational exposures to anthrax occur through contaminated skins and hides.

D. Modes of Transmission

The sources of infection for humans are usually infected animals, contaminated animal products, or environmental contamination by spores from these sources. Cutaneous infection may occur through: contact with contaminated skins, wool, hides, fur, or products made from these materials; contact with tissues of animals that are clinically ill or dead from anthrax; contact with soil contaminated with spores or contact with contaminated bonemeal used in gardening; or, rarely, bites by insects that have bitten infected animals or humans. Cuts or breaks in the skin favor cutaneous infection. Inhalational anthrax may occur after inhalation of spores released during the processing of contaminated animal hides and wool. It may also occur in association with accidental or intentional aerosolization of spores, as may occur with a laboratory accident or bioterrorist event. Intestinal and oropharyngeal anthrax can occur through ingestion of contaminated food, such as under-cooked contaminated meat from anthrax-infected animals. Although infection may occur through exposure to vegetative bacteria in exudates, wounds, or tissues, it is the spore of the anthrax *Bacillus* that is the predominant infectious form.

E. Incubation Period

The incubation period for anthrax is usually 1–7 days, although an incubation period for inhalational anthrax of up to 60 days or longer is possible after exposure to airborne spores.

F. Period of Communicability or Infectious Period

Person-to-person transmission of anthrax has not been documented. Materials and soil contaminated with spores may remain infective for decades.

G. Epidemiology

Although reported anthrax disease is rare in humans, anthrax is epizootic in the U.S., occurring sporadically throughout the country in animals, especially when dry summers are followed by heavy rains. All mammals are susceptible to anthrax to some degree, but ruminants such as cattle, sheep, and goats, are most susceptible, followed by horses and swine. Carnivores appear to be more resistant to anthrax. Outbreaks and cases have been reported in animals in Texas, North and South Dakota, Minnesota, and Nebraska. Livestock may be exposed through water or feed contaminated with spores. Anthrax in animals is common in Central and South America, southern and eastern Europe, Africa, and Asia.

In 2001, 22 cases of anthrax were reported in the U.S. following the intentional contamination of mail. Most of the affected individuals either worked in postal facilities which processed the contaminated letters or worked in or visited offices that received these letters. Massachusetts has not reported a human case of anthrax acquired in the state since 1967. Persons at greatest risk of naturally contracting anthrax are those whose occupations may expose them to infected animals or to contaminated hides, wool, or other animal products. Laboratory workers who handle anthrax-containing specimens are potentially at risk, as are veterinarians and others who handle and treat infected animals.

H. Bioterrorist Potential

B. anthracis is listed by the Centers for Disease Control and Prevention (CDC) as a Category A bioterrorist agent. If acquired and properly disseminated, *B. anthracis* spores could cause a serious public health challenge in terms of ability to limit the number of casualties and to control other effects from such an attack.

Section 2: REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any:

- Suspicion of anthrax called to your attention by a health care provider;
- Positive laboratory result pertaining to anthrax (a patient with a widened mediastinum and/or hemorrhagic mediastinitis, with or without presumptive or confirmatory laboratory results, is a suspect case); or
- Communications received which might convey an anthrax bioterrorism threat or attack (e.g., letter, package, phone call).

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Bioterrorism Response Laboratory (BRL) provides testing services of clinical (and environmental) specimens for *B. anthracis*. Specimens are tested by culture. Acceptable specimens include blood cultures, tissue biopsies, sputum, and swabs taken from lesions. Laboratories can also submit isolates for identification or confirmatory testing. In addition, the BRL requests that all laboratories submit all identified or suspect *B. anthracis* isolates for further identification to aid in the public health surveillance necessary for this illness.

For more information on testing, call the BRL anytime at (617) 590-6390. The laboratory must be notified prior to specimen submission.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify potential sources of transmission in Massachusetts (e.g., imported wool, livestock, or soil), and to stop transmission from such sources.
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Health Care Provider Reporting Requirements

Anthrax is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of anthrax, as defined by the reporting criteria in Section 2A.

Due to the rarity, potential severity, and implications of anthrax in terms of bioterrorism or imported source of infection, the MDPH requests that health care providers immediately report to their LBOH, information about any suspect or diagnosed case of human anthrax. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. A case of anthrax is defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *B. anthracis* infection shall immediately report such evidence of infection, by phone, to the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

For questions related to anthrax in animals or to report a case or suspect case of anthrax in an animal, contact the Massachusetts Department of Agricultural Resources (MDAR), Division of Animal Health, Dairy Services, and Biosecurity (DAH) at (617) 626-1795, or fax the information to the DAH at (617) 626-1850.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that anthrax is reportable to the LBOH and that each LBOH must report any case of anthrax or suspect case of anthrax, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Anthrax Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Under *105 CMR 300.140*, *Reporting of Animal Diseases with Zoonotic Potential by Veterinarians*, any veterinarian or LBOH with knowledge of an animal disease potentially infectious to humans must also report the disease to the DAH. Specific diseases in animals that veterinarians must also report directly to MDPH are anthrax, plague, West Nile virus infection, and eastern equine encephalitis virus infection.

Case Investigation

Upon learning of a suspect or confirmed case of human anthrax or of potential exposure to anthrax, a LBOH should immediately call the MDPH Division of Epidemiology and Immunization, any time of the day or night, at (617) 983-6800 or (888) 658-2850.

1. The MDPH Division of Epidemiology and Immunization will direct case investigation of anthrax in Massachusetts residents, with assistance from the LBOH, as necessary. If a bioterrorist event is suspected, the MDPH and other response officials and authorities will work closely with the LBOH and will provide assistance and information on how to proceed.
2. Following immediate notification of the MDPH, the LBOH may be asked to assist in investigating cases that live within their community, including gathering the following information:
   a. The case's name, age, address, phone number, status (e.g., hospitalized, at home, deceased), and parent/guardian information, if applicable.
   b. The name and phone number of the hospital where the case is or was hospitalized.
   c. The name and phone number of the case's attending physician.
   d. The name and phone number of the infection control practitioner or epidemiologist at the hospital.
   e. If the patient was seen by a health care provider before hospitalization or seen at more than one hospital, be sure to document these providers as well as their phone numbers.
   f. Potential exposure to animals or to imported or domestic animal products.
3. Following immediate notification of the MDPH, the LBOH may be asked to assist in completing an official MDPH *Anthrax Case Report Form* (found at the end of this chapter). Most of the information required on the form can be obtained from the health care provider or from the medical record. Use the following guidelines to assist in completing the form:
   a. Accurately record demographic information.
   b. Record whether the case had gastrointestinal anthrax, inhalational anthrax, cutaneous anthrax, or a combination of any of these.
   c. Record date and time of the onset of illness, symptom information, and patient status (e.g., recovered, died) as accurately as possible.
   d. Exposure history: Use the full incubation period for anthrax (1–60 days). Specifically, focus on the period beginning a minimum of 1 day prior to the case's onset date back to 60 days before onset for the following exposures:
      i. Travel history: Determine the date(s) and geographic area(s) traveled to by the case to identify where the patient may have become infected.

ii. Animals/animal products: For cutaneous or inhalational anthrax, ask about exposure to animals and/or animal products.

iii. Meat consumed: For intestinal or oropharyngeal anthrax, ask about sources of meat consumed.

iv. Laboratory exposure: Determine whether the case works in a laboratory where live *B. anthracis* may be handled.

4. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

5. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

6. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4:

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements *(105 CMR 300.200)*

Minimum Period of Isolation of Patient

Until lesions are healed or free of anthrax bacilli.

Minimum Period of Quarantine of Contacts

No restrictions.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Standard precautions for cases are recommended. Contaminated dressings and bedclothes of cases should be burned or steam-sterilized to destroy spores.

C. Managing Special Situations

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If any cases of anthrax occur in individuals in your city/town or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. A common vehicle, such as a factory processing hides, hair, or

skins, should be sought, and applicable preventive or control measures should be instituted. Consult with the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

For a potential bioterrorist event, the MDPH and other response officials and authorities will work closely with the LBOH and will provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

Implicated food or animal products must be removed from the environment. A decision about testing implicated food items can be made in consultation with the MDPH Center for Environmental Health, Food Protection Program (FPP) at (617) 983-6712 or with the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. Pickup and testing of food samples can be coordinated through the FPP. If a commercial product is suspected, the FPP will coordinate follow-up with relevant outside agencies.

Personal Preventive Measures/Education

To reduce risk of anthrax, the MDPH recommends the following:

- Individuals at significant, continuing risk of acquiring anthrax (e.g., laboratory workers) should be vaccinated.
- Employees who work with animal products of potentially infected animals should be educated about anthrax and about how to minimize exposure.

An Anthrax Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control."

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for anthrax. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting a case to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Clinical Description

An illness with acute onset characterized by several distinct clinical forms, including the following:

Cutaneous	A skin lesion evolving during a period of 2–6 days from a papule, through a vesicular stage, to a depressed black eschar.
Inhalational	A brief prodrome resembling a viral respiratory illness, followed by development of hypoxia and dyspnea, with radiographic evidence of mediastinal widening.
Gastrointestinal	Severe abdominal lesions in the oral cavity or oropharynx, cervical adenopathy and edema, and fever.

Laboratory Criteria for Diagnosis

- Isolation of *B. anthracis* from a clinical specimen;
- Anthrax electrophoretic immunotransblot (EITB) reaction to the protective antigen and/or lethal factor bands in one or more serum samples obtained after onset of symptoms; or
- Demonstration of *B. anthracis* in a clinical specimen by immunofluorescence.

Case Classification

Confirmed	A clinically compatible case that is laboratory-confirmed.

REFERENCES

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FORMS & WORKSHEETS

Anthrax

(Also known as Woolsorter's disease, malignant pustule)

Anthrax

REPORT IMMEDIATELY

(Also known as Woolsorters' disease, malignant pustule)

LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to anthrax case investigation activities.

LBOH staff should follow these steps when anthrax is suspected in the community or if any communications are received which might convey an anthrax bioterrorism threat or attack (e.g., letter, package, phone call). For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ❑ Immediately notify the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any suspect case(s) of anthrax, including threats. The MDPH will direct the investigation of anthrax cases in Massachusetts.
- ❑ To report a case or suspect case of anthrax in an animal, contact the Massachusetts Department of Agricultural Resources (MDAR), Division of Animal Health, Dairy Services, and Biosecurity (DAH) at (617) 626-1795, or fax the information to the DAH at (617) 626-1850.
- ❑ Work with the MDPH to obtain laboratory confirmation.
- ❑ Work with the MDPH to obtain clinical, demographic, and exposure information.
- ❑ If requested by MDPH, fill out the case report form (attach laboratory results).
- ❑ Send the completed case report form, with attached laboratory reports, to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).